KASPERRY Π

TREBALL DE FINAL DE GRAU

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SUMMARY

Kasperry PI consists of deploying a Kubernetes cluster, which has four Raspberry PI 4 (4Gb) and a development Raspberry PI to build the Docker images, also it will be accessible world-wide.

Kasperry PI required research and development to be able to build the cluster and make it work with public internet. The cluster contains monitoring, security and routing using ingress route. In order to achieve this, DataDog was implemented for monitoring and Traefik for doing the DNS routing. Security was a major concern and it has been implemented in every part of the cluster.

Kasperry PI project covers how to implement a CI/CD environment using Github and Github Actions, which is the new schema to work with distributed applications in microservices.

INTRODUCTION

Objective

Context

OBJECTIVE

Research	how to do it.
Try	Kubernetes deployed into Raspberry PI.
Prove	a production-ready home cluster.
Share	a website with the knowledge by using the cluster.

CONTEXT

What is Kubernetes?

What is Raspberry PI?

Why nobody did this before?

WHAT IS KUBERNETES?

Kubernetes (also known as k8s) is an open source container orchestration platform that automates many of the manual processes involved in deploying, managing, and scaling containerized applications.

In other words, you can cluster together groups of hosts running Linux containers, and Kubernetes helps you easily and efficiently manage those clusters.

Recommended to know:

- Linux environment
- Docker & Containers
- Helm

WHAT IS RASPBERRY PI?

Raspberry Pi is a low cost, credit-card sized computer.

- Pros
  - Small size
  - Energy efficient
  - Low-cost
- Cons
  - Resources like CPU and memory RAM are limited
  - ARM platform is not fully supported
  - Lack of community support for platforms like Kubernetes

WHY NOBODY DID THIS BEFORE?

- Raspberry PI did not have enough resources until mid-2019
  - Rancher k3s was used.
- Official platforms like Ubuntu, MariaDB, MongoDB, PostgreSQL, etc. did not provide ARM support
  - Nowadays, There are still a lot of platforms not ARM friendly
- An advanced level of networking and Kubernetes is required

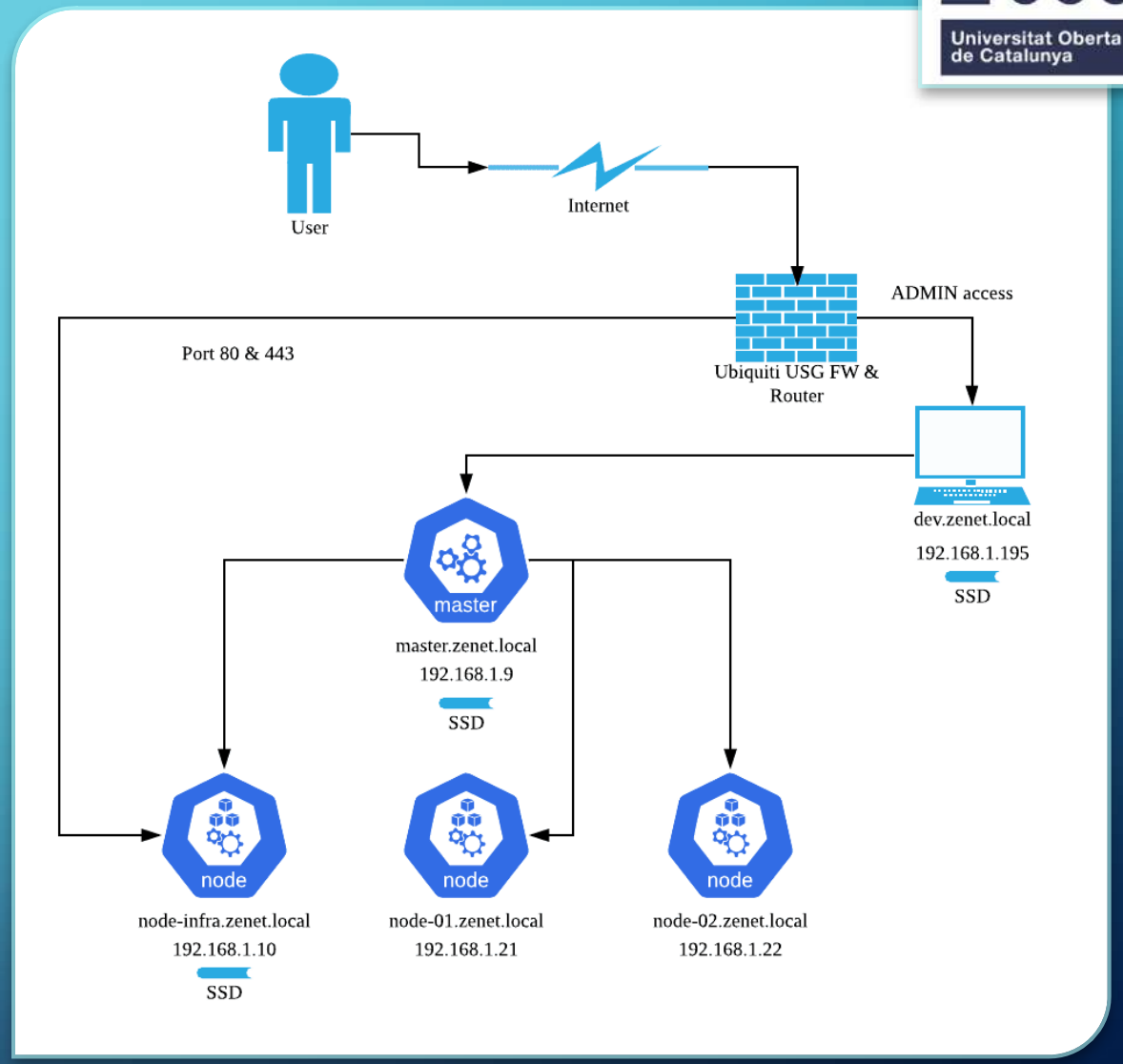
PROPOSAL

Cluster

Web

CLUSTER - HARDWARE

- 5 Raspberry PI
  - 1 Master node
  - 3 Worker nodes
  - 1 Dev node
- Master node and Worker node (node-infra) BOOT using USB3 and SSD external Disk
- External access to node-infra in ports 80 (HTTP) and 443 (HTTPS)



CLUSTER - SOFTWARE

- Kubernetes
- Docker Registry
- Traefik
- DataDog Agent DaemonSet
- Github Action Self-hosted running in dev-node

WEB

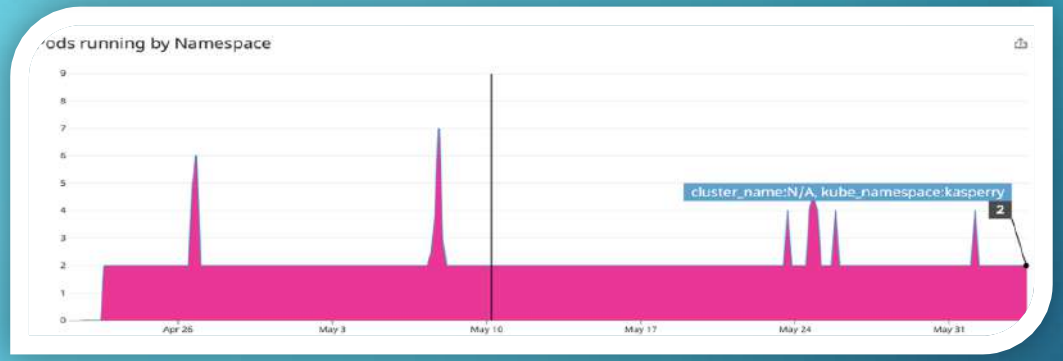
- Publish the tutorials on how to build a Kubernetes cluster using Raspberry PI
- Gatsby will be used to build it
- Deploy it using CI / CD

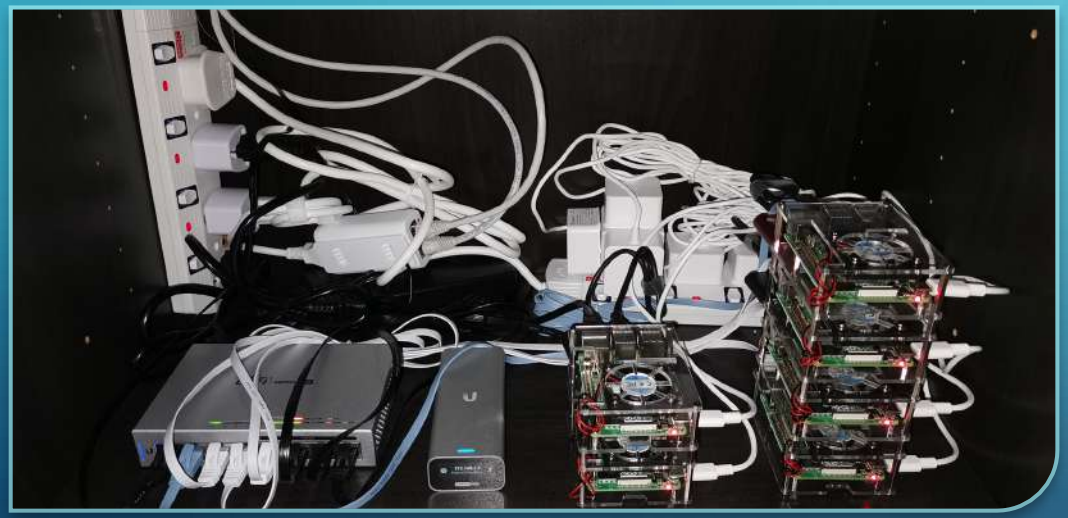
Standard of success

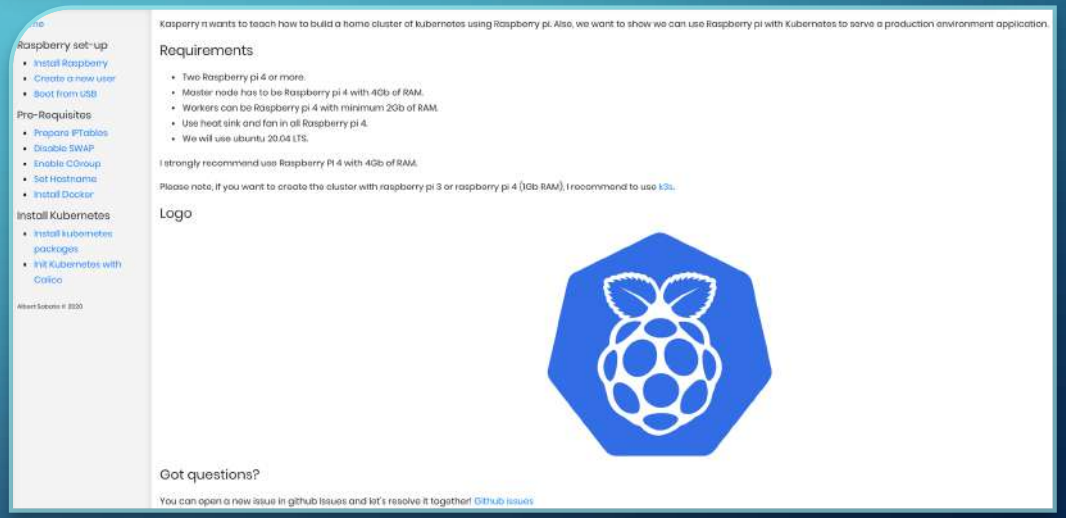
- It must be up and running 24/7 without any downtime for 30 days.

RESULTS

- Kasperry PI website online 24/7 and healthy > 30 days
- Deployments handled by Github Actions
- Monitoring provided by DataDog
- https://kasperry.io/







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THANK YOU

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